

## COMPACT AND EFFICIENT THREE DIMENSIONAL ANTENNAS

### ABSTRACT

1 A volumetrically compact and efficient antenna, with a  
2 high radiation resistance and low losses, that can be  
3 designed for any frequency, and which has a gain within 1  
4 dB of that of a full-sized vertical monopole radiator or,  
5 in its horizontally polarized form, within 2 dB of that  
6 of a horizontally polarized half-wave dipole. One  
7 embodiment is a rectangle, with short radiators and long  
8 interconnecting wires, which has been folded back on  
9 itself in a manner that results in a square configuration  
10 (when viewed from the top) and brings the two radiating  
11 wires into close proximity. Only a single port need be  
12 fed. Linear loading sections, such as stubs, serrations  
13 and helically wound interconnecting wires can be used to  
14 electrically lengthen the antenna, while keeping physical  
15 dimensions small. Capacitive loading sections are also  
16 used. Two unequal-sized rectangular loops may be joined  
17 onto each other, to provide an additional radiating  
18 element.